

## SOLUTIONS FOR WIEC 2024 P456/1

Item ①

a) i)

Tablet 1: every 6 hours

Tablet 2: every 4 hours.

Finding the LCM of 6 and 4.

2	6	4	$\text{LCM} = 2 \times 2 \times 3 M=1$
2	3	2	$I=1$
3	3	1	
1	1		= 12 hours.

$$\text{Required time} = 9:00\text{Am} + 12:00\text{hrs. } M=1 \\ = 21:00\text{hrs.}$$

They will take both tablets again at  $\approx 21:00\text{hrs}$  (9:00pm).  $AP=1$

ii)

$$\text{Purchasing price} = 12 \times 3.6 \text{ million } I=1 \\ = \text{shrs. } 36,000,000. \cancel{M=1}$$

$$\text{Markup} = \frac{25}{100} \times \text{shrs. } 3,600,000 I=1 \\ = \text{shrs. } 900,000.$$

$$\text{Total sales} = \text{shrs. } 3,600,000 + \text{shrs. } 900,000 M=1 \\ = \text{shrs. } 4,500,000.$$

$$\text{Discount} = \frac{10}{100} \times \text{shrs. } 4,500,000 M=1 \\ = \text{shrs. } 450,000.$$

$$\text{Net sales} = \text{shrs. } 4,500,000 - \text{shrs. } 450,000. I=1 \\ = \text{shrs. } 4,050,000. M=1$$

$$\text{Profit} = \text{shrs. } 4,050,000 - \text{shrs. } 3,600,000 \\ = \text{shrs. } 450,000 AP=1$$

$$\text{Tax} = \frac{15}{100} \times \text{shrs. } 450,000 M=1 \\ = \text{shrs. } 67500 AP=1$$

$\therefore$  Profit after deducting tax and discount is ~~dstalling~~ to shrs. 450,000.

$$\text{School Amount spent on school fees} \\ = \frac{30 \times \text{shs. } 450,000}{100}$$

$$= \text{shs. } 135,000. \quad AP=1$$

$$\begin{aligned} \text{Remaining amount paying school fees} \\ \text{and tax} &= (\text{shs. } 450,000 - (\text{shs. } 67500 + \text{shs. } 135000)) M=1 \\ &= \text{shs. } 247,500. \end{aligned}$$

$$\text{Donation} = \frac{1}{5} \times \text{shs. } 247,500 \quad M=1$$

$$= \text{shs. } 49500. \quad AP=1$$

$$\begin{aligned} \text{Amount re-invested} &= \text{shs. } 247,500 - \text{shs. } 49500 \\ &= \text{shs. } 198,000. \quad AP=1 \end{aligned}$$

$\therefore$  she spent shs. 135,000 on school fees, shs. 49500 on donations and re-invested shs. 198,000.  $AP=1$

b)

$$\begin{aligned} \text{Extra amount she needs to save to contribute} \\ \text{shs. } 500,000 \text{ to a community project} \\ &= \text{shs. } 500,000 - \text{shs. } 198,000. \quad I=1 \\ &= \text{shs. } 302,000. \end{aligned}$$

$\therefore$  she needs to save extra amount of shs. 302,000 in order to contribute shs. 500,000 to a community project.  $AP=1$

Homework

a)

Let  $x$  be the number of Mandazi;  
 $y$  be the amount of wheat.

$x$	$y$
48	2
168	7

(48, 2) and (168, 7)

$$\text{Gradient, } m = \frac{7-2}{168-48} \quad M=1$$

$$= \frac{5}{120}$$

$$m = \frac{1}{24} \quad M=1$$

$$\text{Using } y = mx + c \\ x = 48, y = 2, m = \frac{1}{24}.$$

$$2 = \frac{1}{24} \times 48 + c \quad M=1$$

$$2 = 2 + c$$

$$c = 0.$$

$$\therefore y = \frac{1}{24}x + 0.$$

$$y = \frac{1}{24}x, \quad M=1$$

The mathematical relationship between number of Mandazi, ( $x$ ) and amount of wheat ( $y$ ) is

$$x = 24y. \quad AP=1$$

b)  $x = 250, y = ?$

$$y = \frac{1}{24} \times 250 \quad M=1$$

$$y = 8\frac{1}{3}\text{kg}, \quad M=1$$

Therefore  $8\frac{1}{3}\text{kg}$  of wheat are required for 250 Mandazi.

c) i)

Let  $x$  be the number of polythene bags.  
Let  $y$  be the number of paper bags.

Inequalities

$$i) \quad x > y \quad F = 1$$

$$ii) \quad x \leq 100 \quad F = 1$$

$$iii) \quad y \geq 60 \quad F = 1$$

$$iv) \quad x + y \leq 200 \quad F = 1$$

v)  $x > 10$       vi) Equations of lines.

$$x = y$$

$$x = 100$$

$$y = 60$$

$$x = 0$$

$$x + y = 200$$

$$x = y$$

$x$	100	50
$y$	100	150

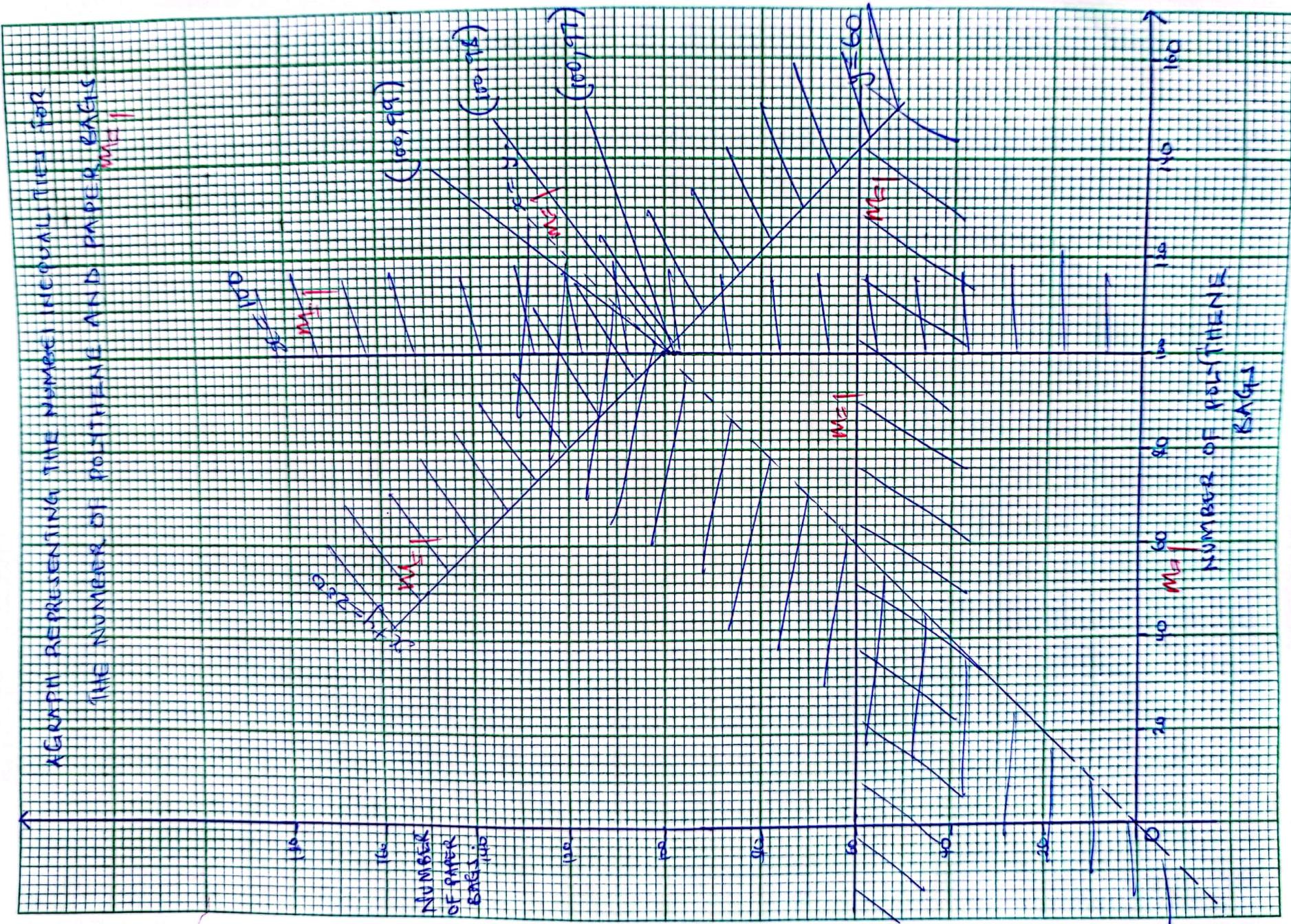
$$(100, 100) \quad (50, 150) \quad (1, 1) \quad (2, 2)$$

$$w=1$$

Q)

The highest number of polythene bags is 100 and  
the highest number of paper bags is 99.  $F_P = 1$

A graph representing the number of inequilities for the number of polythene and paper bags |



Hom ③ (a)

R - Romance      A - Adventure      M - Musical.

$$n(R) = 420$$

$$n(M) = 460$$

$$n(A) = 340$$

$$n(Man) = 180$$

$$n(Wm) = 260$$

$$n(WnA) = 150$$

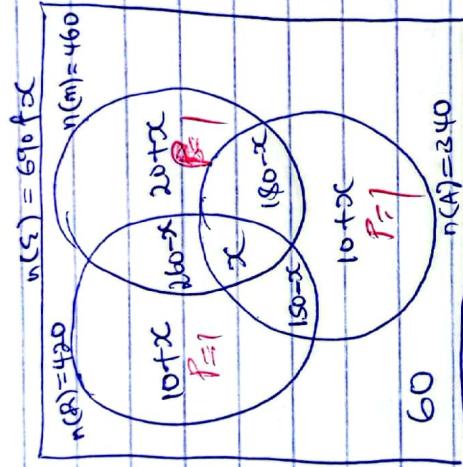
$$n(WnAm) = 60$$

$$\text{Let } n(WnAm) = x.$$

A VENN DIAGRAM REPRESENTING THE GIVEN DATA

$$P=1$$

DATA



Value of  $x$ .

$$2(150-x) = x \quad A=1$$

$$300 - 2x = x$$

$$\frac{300}{3} = \frac{3x}{3} \quad A=1$$

$$x = 100 \quad A=1$$

i) 150 students like all the three types of movies  $A=1$

ii)

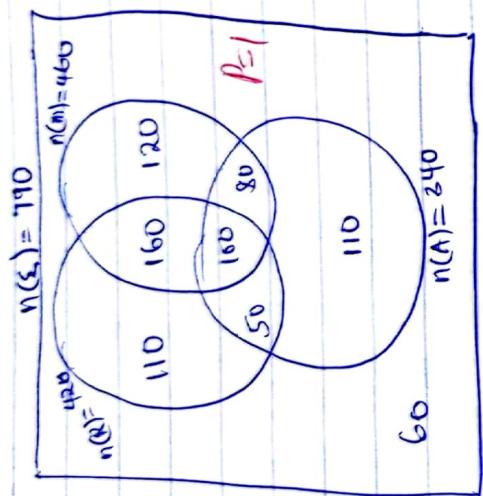
$$n(C) = 690 + x \quad A=1$$

$$= 690 + 100$$

$$= 790 \quad A=1$$

790 students were surveyed by the entertainment prefect.  $A=1$

b)



$$P(R \cap m) = \frac{260}{790}$$

$$= 0.3$$

$$P(m \cap A) = \frac{180}{790}$$

$$= 0.2$$

$$P(R \cap A) = \frac{150}{790}$$

$$= 0.2$$

There is no true movie type to be selected since all the probabilities are not in the given range of 0.5 to 1.  $AP = 1$

ITEM FREQUENCY DISTRIBUTION BELOW SHOWS P=1

i)

Classes	f	X	$\sum f_x$	Cut	C.B
20 - 29	10	24.5	245	10	19.5 - 29.5
30 - 39	130	34.5	4485	140	29.5 - 39.5
40 - 49	270	44.5	12925	430	39.5 - 49.5
50 - 59	300	54.5	16350	730	49.5 - 59.5
60 - 69	190	64.5	12255	920	59.5 - 69.5
70 - 79	80	74.5	5960	1000	69.5 - 79.5
80 - 89	20	84.5	1690	1020	79.5 - 89.5
			$\Sigma f_x^2$		
			59890		
			A=1		P=1

" Average time =  $\frac{\sum f_x}{\sum f}$

$$= \frac{53890}{1020} A=1$$

$$= 52.8 \bar{z}$$

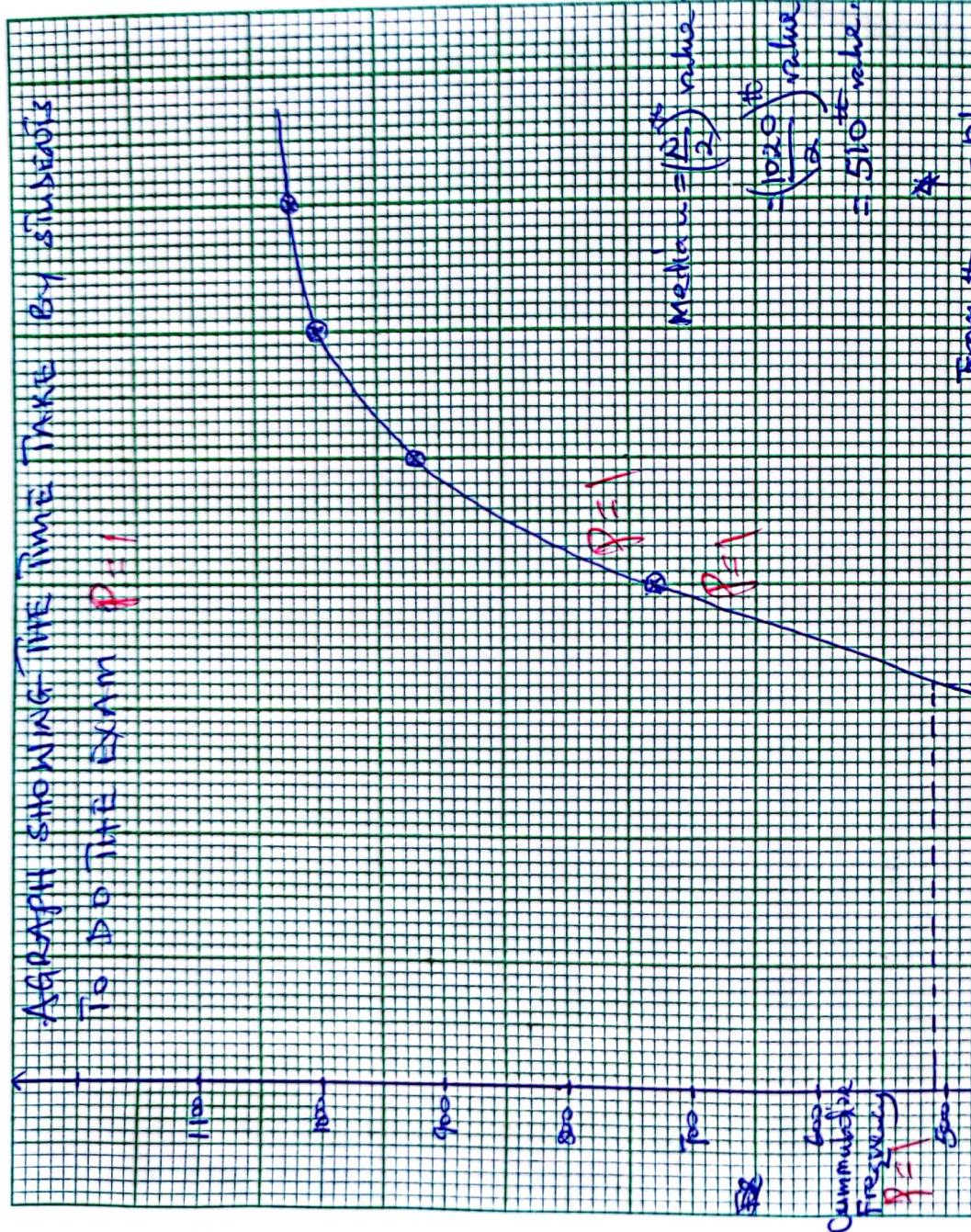
$$\approx 53 \text{ hrs. } AP=1$$

The average time taken was 53 hrs ~~AP=1~~  
iii Refer to graph.

From the graph

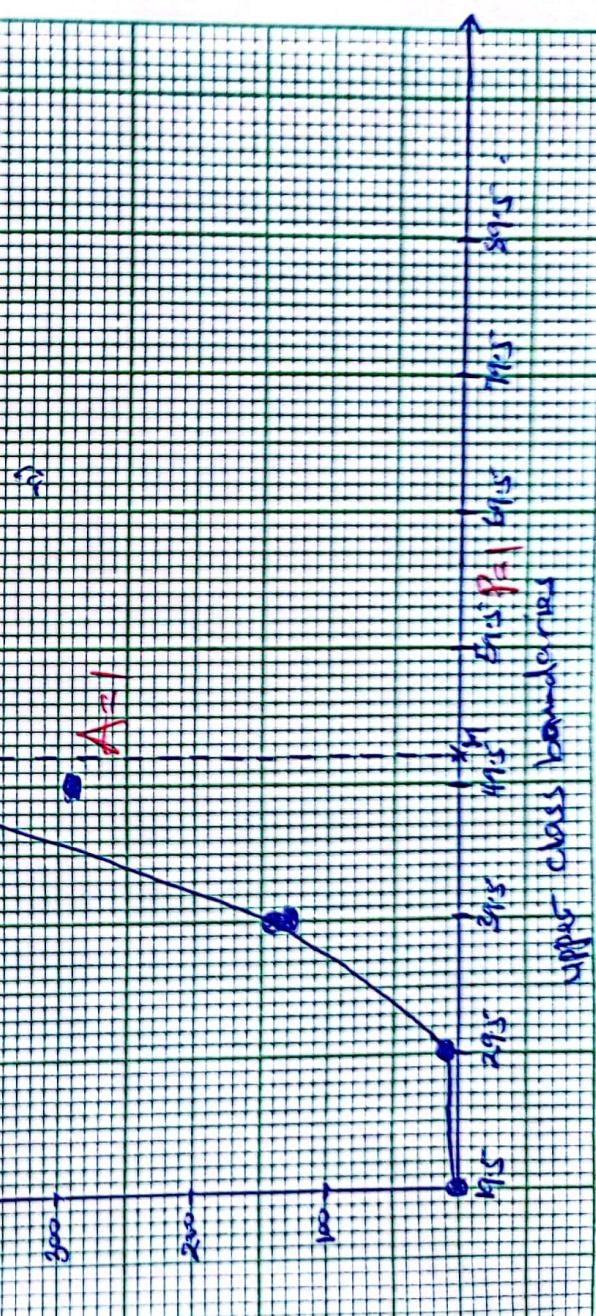
$$\text{Median} = 51.5 \pm 0.1 \quad AP=1$$

The median is  $51.5 \pm 0.1 \quad AP=1$   
Note; Accept frequencies from 10 and an deviation.



$$\begin{aligned}
 \text{Median } u &= \left(\frac{n}{2}\right)^{\text{th}} \text{ value} \\
 &= \left(\frac{1020}{2}\right)^{\text{th}} \text{ value} \\
 &= 510^{\text{th}} \text{ value} \\
 &= 51.5
 \end{aligned}$$

From the graph  
Median = 49.5 + 2.



Ans: Ratio = 2 : 4 : 5

$$\text{Total Ratio} = 2 + 4 + 5 \\ = 11. \quad AP = 1$$

No. of students who did exam in;

$$\text{One hour} = \frac{2}{11} \times 1020$$

$$= 185.45.$$

$$\approx 185 \text{ students } AP = 1$$

$$\text{In two hours} = \frac{4}{11} \times 1020 \quad AP = 1$$

$$= 371 \text{ students } AP = 1$$

$$\text{In } 2\frac{1}{2} \text{ hours} = \frac{5}{11} \times 1020$$

$$= 464 \text{ students } AP = 1$$

Note: Accept those who used 300 as total,

$$\text{Using } T + O = T'$$

$$T = \begin{pmatrix} 1 \\ 5 \end{pmatrix} - \begin{pmatrix} 1 \\ 3 \end{pmatrix}$$

$$T = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \quad m=1$$

Also

$$T = \begin{pmatrix} 4 \\ 2 \end{pmatrix} - \begin{pmatrix} 3 \\ 0 \end{pmatrix}$$

$$T = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \quad m=1$$

A is transformed to A' using a translation vector  $\begin{pmatrix} 1 \\ 2 \end{pmatrix}$   $\text{AP}=1$

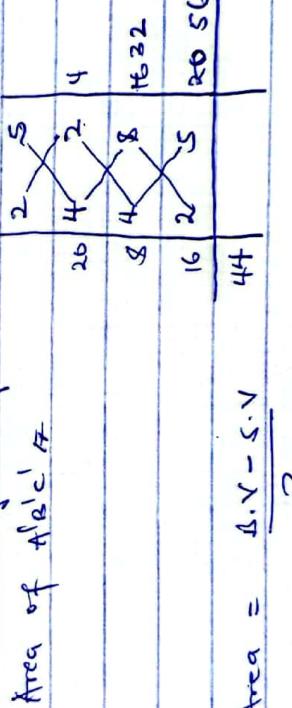
(i)

$$\text{Area of } A'B'C' = \frac{1}{2} \times 6 \times 2 \quad M=1$$

$$= 6 \text{ square units. } M=1$$

or

By Coordinate geometry.



$$= \frac{56 - 44}{2}$$

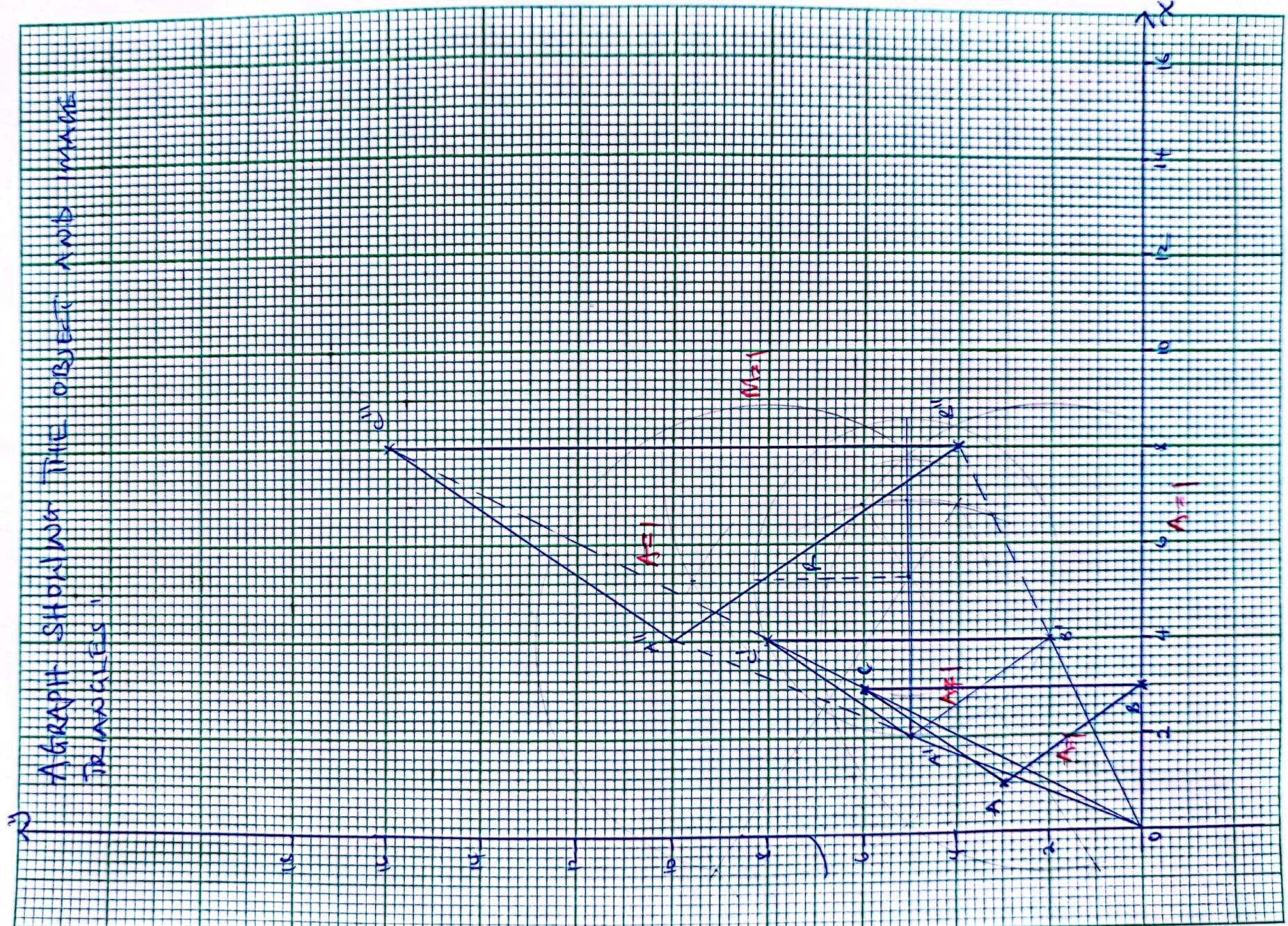
Area. = 6 square units.

$$\text{Area of circle} = \pi r^2, \quad \pi = \frac{22}{7}, \quad r = 3.2 \text{ cm units}$$

$$= \frac{22}{7} \times 3.2^2 \text{ AP} \mid$$

$$= 32.1829 \text{ square units. } M=1$$

Area of the remaining part cut off by the triangle =  $22.1829 \text{ square units} - 6 \text{ sq. units. } \text{AP} \neq 1$   
 $= 26.1829 \text{ square units. } \text{AP} \neq 1$



5)

Taking the centre of enlargement be  $(0,0)$ .  
from the graph;

$$A''(4,10) \quad B''(8,4) \quad C''(8,16)$$

Method II

Matrix of matrix transformation =  $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$

$$T = M \times O$$

$$= \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} 4 & 8 & 8 \\ 2 & 4 & 16 \end{pmatrix} \text{ } M=1$$

$$= \begin{pmatrix} 2+0 & 8+0 & 8+0 \\ 0+0 & 0+4 & 0+16 \end{pmatrix}$$

$$= \begin{pmatrix} 2 & 8 & 8 \\ 0 & 4 & 16 \end{pmatrix} \text{ } M=1$$

$$= A''(4,10) \quad B''(8,4) \quad C''(8,16) \text{ } AP=1$$

Then plot coordinates and join them to form triangle  $A''B''C''$ .

(i)

By Coordinate geometry.

$$\begin{array}{c|ccc|c} & 4 & 10 & & 16 \\ & 8 & 4 & & \\ \hline 80 & & & & \\ 32 & 8 & 16 & & 128 \\ 4 & 4 & 10 & 80 & \\ \hline 176 & & & 224 & \\ \hline & & & & \\ & & & & \\ & & & & \end{array}$$

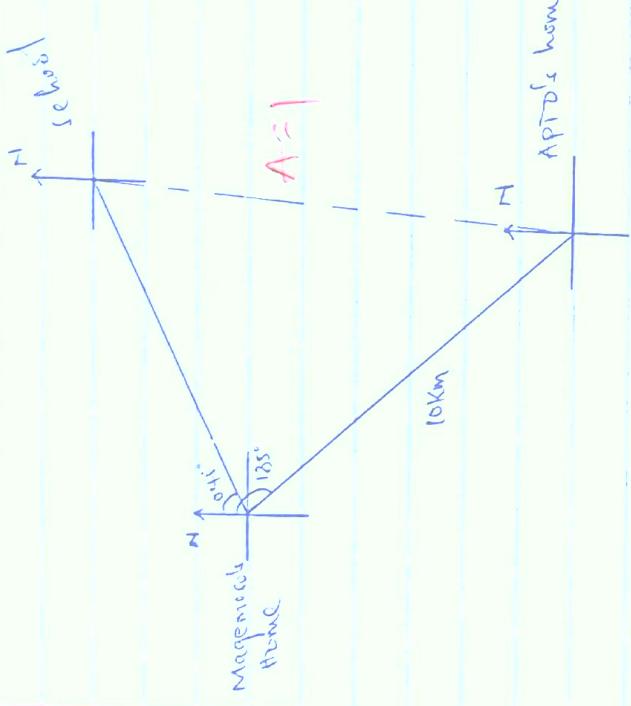
$$\text{Area} = \frac{224 - 176}{2} \text{ } M=1$$

$$= \frac{48}{2}$$

Area of  $A''B''C''$  is 24 square units.  $AP=1$

Item 6.

(i)



$$D = c \times t$$

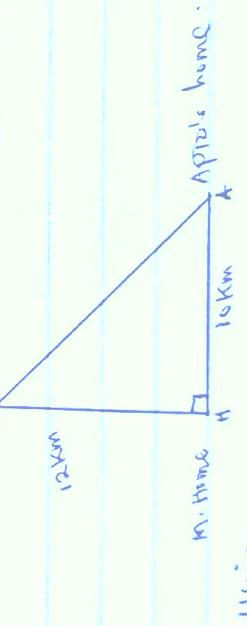
$$= 24 \times \frac{1}{2} \quad A = 1$$

$$= 12 \text{ Km. } m = 1$$

∴ The distance from Magenmalo's home to the school  
is 12 Km.  $AP = 1$

(ii)

From the sketch,  
School



Using  $\Delta H^2 + M^2 = A^2$

$$\cdot A^2 = 12^2 + 10^2 \quad m = 1$$

$$A^2 = \sqrt{144+100} \quad A = 1$$

$$= \sqrt{244}$$

$$= 2\sqrt{61} \quad m = 1$$

$$A^2 = 15.6 \text{ Km.}$$

∴ The distance between Mr. Apito home to school is  $A^2 = 15.6 \text{ Km.}$

b)

$$\text{Total distance} = 10\text{km} + 15.6\text{km.} \\ = 25.6\text{km.}$$

$$\text{Total time taken} = \frac{25.6}{25f} \\ = \frac{16}{15} \text{ hours. } M=1$$

$= 1 \text{ hour and } 4 \text{ minutes.}$

$$\text{Required time} = 7:30\text{Am} - 1:54 \text{ hours. } M=1$$

$= 6:26\text{Am. } M=1$   
 Mr. Magemoso is supposed to leave home at  
~~6:26am~~ ~~at school~~ at 7:30 Am.

c)

Isabel sells

each sweet cost = shs. 500.

Number of sweets sold = 100.

Commission =  $10 \times 5$ .

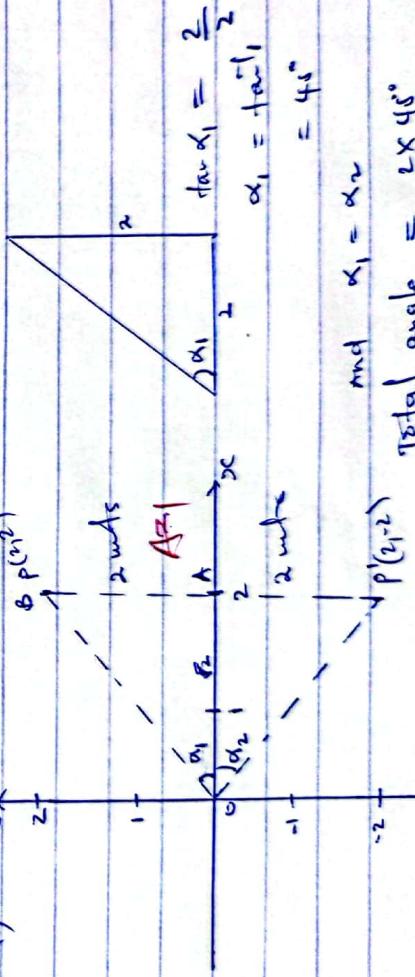
$$\text{Total sales} = \text{shs. } (500 \times 100) \quad M=1 \\ = \text{shs. } 50,000.$$

$$\text{Commission} = \frac{10}{100} \times \text{shs. } 50,000 \quad M=1 \\ = \text{shs. } 5000 \quad M=1$$

$$\text{Required amount} = \text{shs. } 50,000 - \text{shs. } 5000 \quad M=1 \\ = \text{shs. } 45,000.$$

i. Mr. Magemoso should give Mr. Apio shs. 45,000 after taking his commission.  $\Delta P=1$

d)



$$\text{and } \alpha_1 = \alpha_2$$

$$= 45^\circ.$$

$$\Delta P(2,2) \text{ total angle} = 2 \times 45^\circ$$

$$= 90^\circ.$$

Mr. Magemoso should turn 90° clockwise to park in order to park in the available space.  $\Delta P=1$